

**NATIONAL DOUBLE ELIMINATION - 4**

**TOSS-UP**

- 1. MATH; Multiple Choice: If a right circular cone is cut parallel with the axis of symmetry, you would reveal**

(W) a circle.  
(X) a hyperbola.  
(Y) an ellipse.  
(Z) a parabola.

**ANSWER: X-- A HYPERBOLA**

**BONUS**

- 1. MATH; Short Answer: How many prime numbers are there between 30 and 60?**

**ANSWER: SEVEN**

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**TOSS-UP**

- 2. PHYS; Multiple Choice: Weather satellites transmit cloud cover and temperature-humidity profiles back to Earth using images of which combination of the electromagnetic radiation types?**

(W) infra-red and visible light  
(X) ultraviolet and nuclear magnetic  
(Y) ultraviolet and infra-red  
(Z) ultraviolet and visible light

**ANSWER: W-- INFRA-RED AND VISIBLE LIGHT**

**BONUS**

- 2. PHYS; Multiple Choice: What is the theoretical limit of the efficiency of a single-crystal single-junction cell in a photovoltaic system?**

(W) 9 percent  
(X) 29 percent  
(Y) 79 percent  
(Z) 99 percent

**ANSWER: X-- 29 PERCENT**

**TOSS-UP**

**3 BIOL; Multiple Choice: Calcitonin is produced by specialized cells in the**

- (W) anterior pituitary.
- (X) posterior pituitary.
- (Y) gonads.
- (Z) thyroid gland.

**ANSWER: Z-- THYROID GLAND**

**BONUS**

**3 BIOL; Multiple Choice: The treatment of Addison's disease involves**

- (W) decreasing the activity of the adrenal cortex.
- (X) decreasing the activity of the adrenal medulla.
- (Y) doses of adrenal cortical hormones.
- (Z) doses of noradrenaline.

**ANSWER: Y-- DOSES OF ADRENAL CORTICAL HORMONES**

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**TOSS-UP**

**4 CHEM; Multiple Choice: A reaction is likely to proceed to completion if**

- (W) a liquid is formed.
- (X) a gas is formed.
- (Y) no water is formed.
- (Z) it occurs in water.

**ANSWER: X-- A GAS IS FORMED**

**BONUS**

**4 CHEM; Multiple Choice: When the concentration of an ion that is part of the solubility expression is added to a saturated solution, what will occur?**

- (W) Nothing will occur.
- (X) The solubility will increase.
- (Y) The solution will become unsaturated.
- (Z) Precipitation will occur.

**ANSWER: Z-- PRECIPITATION WILL OCCUR**

**TOSS-UP**

**5. COMP; Multiple Choice: The interface that enables similar networks to communicate is called**

- (W) bus network.**
- (X) bulletin board network.**
- (Y) cable modem.**
- (Z) bridge.**

**ANSWER: Z-- BRIDGE**

**BONUS**

**5. COMP; Multiple Choice: The acronym TCP/IP (read T-C-P slash I-P) stands for**

- (W) To Computer Personnel/Internet Personnel.**
- (X) To Communications Protocol and Interested Parties.**
- (Y) Transmission Control Protocol/Internet Protocol.**
- (Z) Telecommuting Control Protocol/Intranet Protocol.**

**ANSWER: Y-- TRANSMISSION CONTROL PROTOCOL/INTERNET PROTOCOL**

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**TOSS-UP**

**6. BIOL; Multiple Choice: The beta cells of the pancreas secrete**

- (W) luteinizing hormone.**
- (X) oxytocin.**
- (Y) insulin.**
- (Z) glucagon.**

**ANSWER: Y-- INSULIN**

**BONUS**

**6. BIOL; Multiple Choice: When the neurosecretory cells of the hypothalamus are stimulated, ADH and oxytocin are released in the**

- (W) posterior pituitary.**
- (X) anterior pituitary.**
- (Y) thyroid.**
- (Z) parathyroid.**

**ANSWER: W-- POSTERIOR PITUITARY**

**TOSS-UP**

7. **PHYS; Multiple Choice:** A solar cell does NOT respond to red light, but DOES respond to green light. The solar cell will be able to respond to
- (W) microwaves.
  - (X) infra-red light.
  - (Y) ultraviolet light.
  - (Z) all of the above

**ANSWER: Y-- ULTRAVIOLET LIGHT**

**BONUS**

7. **PHYS; Short Answer:** A 50 millimeter focal length camera lens photographs a 4 meter tall tree at a distance of 20 meters. How tall is the image of the tree?

**ANSWER: 10 MILLIMETERS**

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**TOSS-UP**

8. **CHEM; Multiple Choice:** The ionic compound formed in an acid-base neutralization reaction is
- (W) an indictor.
  - (X) a hydride.
  - (Y) a hydroxide.
  - (Z) a salt.

**ANSWER: Z-- A SALT**

**BONUS**

8. **CHEM; Multiple Choice:** A substance is generally considered sparingly soluble if its solubility per liter of water is
- (W) less than 0.01 mole.
  - (X) less than 0.1 mole.
  - (Y) less than 1.0 mole.
  - (Z) more than 1.0 mole.

**ANSWER: W-- LESS THAN 0.01 MOLE**

**TOSS-UP**

- 9. ASTR; Multiple Choice: What civilization created the Zodiac to divide the path of the Sun into twelve equal places?**

(W) Egyptians  
(X) Chinese  
(Y) Greeks  
(Z) Babylonians

**ANSWER: Z-- BABYLONIANS**

**BONUS**

- 9. ASTR; Short Answer: Since the signs of the Zodiac were established, the Sun has gradually shifted its position with respect to the background stars. As a result, the Sun in early December is in front of a constellation that is not part of the Zodiac. Name it.**

**ANSWER: OPHIUCHUS**

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**TOSS-UP**

- 10. PHYS; Multiple Choice: What reflecting surface forms a geometrically perfect image of a point source located at infinity (such as that approximated by a star)?**

(W) Paraboloid  
(X) Ellipsoid  
(Y) Spherical  
(Z) Hyperboloid

**ANSWER: W-- PARABOLOID**

**BONUS**

- 10. PHYS; Multiple Choice: A block of metal that weighs 60 newtons in air and 40 newtons under water has a density, in kilograms per meter cubed, of**

(W) 1000.  
(X) 3000.  
(Y) 5000.  
(Z) 7000.

**ANSWER: X-- 3000**

**TOSS-UP**

**11. CHEM; Multiple Choice: The acid dissociation constant measures an acid's**

- (W) concentration.
- (X) strength.
- (Y) number of protons.
- (Z) degree of sourness.

**ANSWER: X-- STRENGTH**

**BONUS**

**11. CHEM; Multiple Choice: The strength of a Bronsted-Lowry base is determined by its**

- (W) effect on skin and clothing.
- (X) ability to furnish protons.
- (Y) degree of bitterness.
- (Z) attraction for protons.

**ANSWER: Z-- ATTRACTION FOR PROTONS**

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**TOSS-UP**

**12. BIOL; Multiple Choice: If an amphibian has a tail after it undergoes metamorphosis, it is probably a**

- (W) toad.
- (X) frog.
- (Y) snake.
- (Z) salamander.

**ANSWER: Z-- SALAMANDER**

**BONUS**

**12. BIOL; Multiple Choice: In the circulatory systems of adult amphibians, the first loop carries**

- (W) oxygen-poor blood to the lungs.
- (X) oxygen-poor blood to the ventricles.
- (Y) oxygen-rich blood from the body.
- (Z) oxygen-rich blood to the ventricles.

**ANSWER: W-- OXYGEN-POOR BLOOD TO THE LUNGS**

**TOSS-UP**

- 13 ERSC; Multiple Choice: An earthquake with a magnitude of 8.8 on the Richter scale releases how many times more energy than an earthquake with a magnitude of 7.8?**

(W) 10  
(X) 100  
(Y) 32  
(Z) 64

**ANSWER: Y-- 32**

**BONUS**

- 13 ERSC; Multiple Choice: What kind of faults are caused by compressional forces?**

(W) Normal  
(X) Strike-slip  
(Y) Reverse  
(Z) Plastic

**ANSWER: Y-- REVERSE**

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**TOSS-UP**

- 14 CHEM; Multiple Choice: Acidic hydrogens are usually bonded to elements that attract electrons**

(W) very weakly.  
(X) somewhat weakly.  
(Y) somewhat strongly.  
(Z) very strongly.

**ANSWER: Z-- VERY STRONGLY**

**BONUS**

- 14 CHEM; Multiple Choice: The correct name of the acid HBr is**

(W) hydrobromic acid.  
(X) hydrobromous acid.  
(Y) bromate acid.  
(Z) bromite acid.

**ANSWER: W-- HYDROBROMIC ACID**

**TOSS-UP**

15. **PHYS; Multiple Choice:** Five coulombs of charge are placed on a thin-walled conducting shell. Once the charge has come to rest, the electric potential inside the hollow conducting shell is found to be

(W) zero.  
(X) uniform inside the sphere and equal to the electric potential on the surface of the sphere.  
(Y) smaller than the electric potential outside the sphere.  
(Z) varying as one over  $r^2$  squared.

**ANSWER: X– UNIFORM INSIDE THE SPHERE AND EQUAL TO THE ELECTRIC POTENTIAL ON THE SURFACE OF THE SPHERE**

**BONUS**

15. **PHYS; Short Answer:** A two farad and a four farad capacitor are connected in series. What single capacitance is “equivalent” to this combination?

**ANSWER: 4/3 FARADS OR 1.33 FARADS**

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**TOSS-UP**

16. **BIOL; Multiple Choice:** The first fishes were covered with

(W) bony plates and had jaws.  
(X) bony plates and were jawless.  
(Y) scales and had jaws.  
(Z) scales and were jawless.

**ANSWER: X– BONY PLATES AND WERE JAWLESS**

**BONUS**

16. **BIOL; Multiple Choice:** The jawless fishes include the

(W) skates and rays.  
(X) lungfish and rays.  
(Y) skates and lampreys.  
(Z) lampreys and hagfishes.

**ANSWER: Z– LAMPREYS AND HAGFISHES**



**TOSS-UP**

17. **CHEM; Multiple Choice:** The reaction of the anions and cations of salts with water to form acid or base solutions is called

(W) amphoterism.  
(X) dissociation.  
(Y) hydrolysis.  
(Z) neutralization.

**ANSWER: Y-- HYDROLYSIS**

**BONUS**

17. **CHEM; Multiple Choice:** The acid that is often called the “King of Chemicals” is

(W) sulfuric acid.  
(X) nitric acid.  
(Y) phosphoric acid.  
(Z) acetic acid.

**ANSWER: W-- SULFURIC ACID**

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**TOSS-UP**

18. **MATH; Multiple Choice:** Imagine the earth to be a balloon with a 4,000 mile radius. If we inflate the earth to increase the radius 1 ft., the increase in the distance around the earth is

(W) 6.28 feet.  
(X) 62.8 feet.  
(Y) 628 feet.  
(Z) 62,800 feet.

**ANSWER: W-- 6.28 FEET**

**BONUS**

18. **MATH; Short Answer:** A woman has an equal number of nickels, dimes and quarters. If she has \$12 in total, how many coins does she have?

**ANSWER: 90 COINS**

**TOSS-UP**

19. **ASTR; Short Answer:** One of the oldest constellations is associated with a legendary early king of Athens and is supposed to be a charioteer. Name it.

**ANSWER: AURIGA**

**BONUS**

19. **ASTR; Short Answer:** Name the comet, responsible for the Leonid meteor showers, that returned in February 1998.

**ANSWER: TEMPEL-TUTTLE**

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**TOSS-UP**

20. **BIOL; Multiple Choice:** Tadpoles, salamander larvae, and a few adult salamanders get rid of excess carbon dioxide through their

- (W) gills.
- (X) lungs.
- (Y) mouth cavities.
- (Z) skin.

**ANSWER: Z-- SKIN**

**BONUS**

20. **IOL; Multiple Choice:** The circulatory system of a tadpole, unlike that of an adult frog, has a

- (W) double loop.
- (X) triple loop.
- (Y) two-chambered heart.
- (Z) three-chambered heart.

**ANSWER: Y-- TWO-CHAMBERED HEART**

**TOSS-UP**

- 21. GENR; Short Answer: What nocturnal animal group makes up one-fourth of all mammal species?**

**ANSWER: BATS or CHIROPTERA (PRON: KIE'RAHP-TUH-RUH)**

**BONUS**

- 21. GENR; Multiple Choice: Who is considered the Father of the American Space Program?**

(W) Edward Teller  
(X) Werner von Braun  
(Y) John Glenn  
(Z) Robert Oppenheimer

**ANSWER: X-- WERNER von BRAUN**

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**TOSS-UP**

- 22. ERSC; Short Answer: Which discontinuity is located nearly halfway to the center of the earth at a depth of 2900 kilometers?**

**ANSWER: GUTENBERG**

**BONUS**

- 22. ERSC; Multiple Choice: What forms when water that is flowing down a steep slope loses energy as it begins flowing on a level surface?**

(W) alluvial fan  
(X) delta  
(Y) cirque  
(Z) slump

**ANSWER: W-- ALLUVIAL FAN**

**TOSS-UP**

- 23. PHYS; Short Answer: A machine performs 8 Joules of work in 2 seconds. How much power is delivered by this machine?**

**ANSWER: 4 WATTS**

**BONUS**

- 23. PHYS; Short Answer: Name any four of the five elements that are ferromagnetic at room temperature (25 degrees Celsius).**

**ANSWER: IRON; COBALT; NICKEL; GADOLINIUM; DYSPROSIUM**

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**TOSS-UP**

- 24. COMP; Short Answer: For transmitting voice, video, and data simultaneously as digital signals over twisted-pair telephone lines from country to country, a set of international communications standard is used called**

**ANSWER: ISDN**

**BONUS**

- 24. COMP; Multiple Choice: Smalltalk is**

**(W) an object-oriented programming language.  
(X) a very concise program.  
(Y) documentation.  
(Z) a low level programming language.**

**ANSWER: W-- AN OBJECT-ORIENTED PROGRAMMING LANGUAGE**

**TOSS-UP**

25. **GENR; Short Answer:** Occasionally, a bad cold will cause a decrease in a person's hearing ability. What is the name of the tube that becomes blocked to cause this problem?

**ANSWER: EUSTACHIAN TUBE (pron: yu-stay-shen)**

**BONUS**

25. **GENR; Multiple Choice:** In which country was a method for making rust-resistant iron discovered in the fifth century B.C.?

(W) Sumeria

(X) Egypt

(Y) India

(Z) Babylon

**ANSWER: Y– INDIA**